

### **REMARKS**

The Applicants thank the Examiner for the thorough consideration given the present application. Claims 1-17 are pending. Claims 1-13 are amended and 14-17 are added. Claims 1 and 8 are independent. The Examiner is respectfully requested to reconsider the rejections in view of the amendments and remarks set forth herein.

#### **Claim for Priority**

It is gratefully acknowledged that the Examiner has recognized the Applicants' claim for foreign priority. In view of the fact that the Applicants' claim for foreign priority has been perfected, no additional action is required from the Applicants at this time.

#### **Acknowledgement of Information Disclosure Statement**

The Examiner has acknowledged the Information Disclosure Statement filed on May 6, 2002. An initialed copy of the Form PTO-1449 has been returned by the Examiner. No further action is necessary at this time.

#### **Drawings**

The drawings are rejected because they include reference signs not mentioned in the description.

In response, the specification is amended to include solid flow 8 (liquid having entrained air 9 separated therefrom), an outer wall 5, a chamber 12, and a weir 4. No new matter is entered.

Accordingly, reconsideration and withdrawal of this objection are respectfully requested.

**Abstract of the Disclosure**

The Abstract of the Disclosure is amended in order to place it in better form.

**Specification Objection**

The Examiner has objected to the specification because of several informalities.

In order to overcome this objection, the specification is amended herein in order to correct the deficiency pointed out by the Examiner. In addition, a Substitute Specification is being provided in order to place the application in better form. Also included is a marked-up copy of the original specification which shows the portions of the original specification which are being added and deleted. Applicants respectfully submit that the substitute specification includes no new matter and that the substitute specification includes the same changes as are indicated in the marked-up copy of the original specification showing additions and deletions. Reconsideration and withdrawal of this objection are respectfully requested.

**Claim Objections**

The Examiner has objected to claims 1, 2, 3, 5, and 7-13 because of several informalities. In order to overcome this objection, claims 1, 2, 3, 5, and 7-13 are amended herein in order to correct the deficiencies pointed out by the Examiner. Reconsideration and withdrawal of this objection are respectfully requested.

**Claim Amendments**

The Examiner will note that claims 1-13 are amended herein in order to eliminate reference to the elements in the figures and to make minor wording changes placing the claims in better form. The claim amendments are not being made in response to any statutory requirement for patentability, and do not narrow the scope of the claims. Instead, the claims are amended merely to recite the subject matter therein more clearly.

**Rejections Under 35 U.S.C. §102(b) and §103(a)**

Claims 1, 2, and 5-11 stand rejected under 35 U.S.C. §102(b) as being anticipated by any one of Wery (U.S. 2,336,430), Andrews (U.S. 5,931,990), and Brugger (U.S. 5,674,199). Claims 4-5 and 12-13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Caris et al. (U.S. 5,039,425) in view of Wery.

These rejections are respectfully traversed.

**Amendments to Independent Claims 1 and 8**

While not conceding the appropriateness of the Examiner's rejection, but merely to advance prosecution of the present application, independent claim 1 is amended herein to recite a combination of elements directed to an assembly including a liquid-flow guide suspended from an inlet pipe discharging the gas-containing liquid into a container, the liquid-flow guide being disposed substantially close to a lower end of the inlet pipe.

In a similar manner, independent claim 8 is amended herein to recite a combination of steps directed to a method for separating gas from gas-containing liquids, including the step of impinging the gas-containing liquid on a liquid-flow guide suspended from a lower end of an

inlet pipe discharging the gas-containing liquid into a container, thus separating the gas from a liquid flow.

Support for a liquid-flow guide suspended from a lower end of an inlet pipe can be seen in FIGS. 1 and 2, which show liquid-flow guide 2 suspended from inlet pipe 1 via support rods 10.

Applicants respectfully submit that the combinations of elements and method steps as set forth in independent claims 1 and 8, respectively, are not disclosed or made obvious by the prior art of record, including Wery, Andrews, and Brugger.

Applicants respectfully submit that the Wery document merely discloses pointed cone 44 attached to casing 32 via funnel-shaped portion 45; the Andrews document merely discloses flat plate 20 with no indication of being suspended from inlet pipe 12; and the Brugger document merely discloses container base 118 suspended from housing 32 via connectors 114.

Applicants respectfully submit that the combinations of elements and method steps as set forth in independent claims 1 and 8 are not disclosed or made obvious by the prior art of record, including Wery, Andrews, and Brugger, for the reasons explained above.

In view of the above amendments and arguments, independent claims 1 and 8 are in condition for allowance.

**Arguments Regarding Dependent Claims 2 and 9**

Claim 2 as amended herein recites a height position of the flow guide being made adjustable in order to optimize measurement of the gas-containing liquids in pulp, board and paper industries, and to enhance the separation of the gas therein.

Similarly, dependent claim 9 as amended here recites a step of adjusting a height position of the flow guide in order to optimize measurement of gas-containing liquids in pulp, board and paper industries, and to enhance the separation of the gas.

The Applicants respectfully submit that none of the references cited by the Examiner, including Wery, Andrews, and Brugger, teaches or suggests a height position of the flow guide being adjustable.

Therefore, the Applicants respectfully submit that claim 2 and 9 set forth allowable subject matter.

**Added Claims 14-17**

The Examiner will note that claims 13-17 are added to set forth additional novel combinations of elements and method steps.

In view of the above described amendments and arguments, independent claims 1 and 8 are in condition for allowance. Dependent claims 2-7 and 9-17 are also in condition for allowance due to their dependence on allowable independent claims, as well as for the additional novel limitations set forth therein.

Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. §102(b) and §103(c) are respectfully requested.

**CONCLUSION**

Since the remaining patents cited by the Examiner have not been utilized to reject claims, but merely to show the state of the art, no comment need be made with respect thereto.

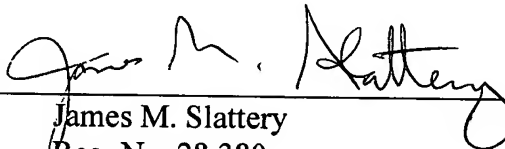
All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. It is believed that a full and complete response has been made to the outstanding Office Action, and that the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, he is invited to telephone Carl T. Thomsen (Reg. No. 50,786) at (703) 205-8000.


Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a one (1) month extension of time for filing a reply in connection with the present application, and the required fee of \$55.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,  
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Attachments: Revised Abstract  
Substitute Specification



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~~Assembly and method for separating gas from flowing liquids~~

ASSEMBLY AND METHOD FOR SEPARATING GAS FROM FLOWING LIQUIDS

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an assembly ~~in accordance with the pre-~~  
~~amble of claim 1~~ for separating gas from flowing liquids handled in a process industry.

Description of Background Art

[0002] Gases such as air entrained in liquids handled in a process industry are often problematic. The complications occur most frequently in the pumping or measurement of liquids. Gas, particularly air, carried abundantly along with liquids complicates measurements imposed on liquids whereby typically the sensing results become inaccurate and unreliable. Moreover, since air also causes other process complications such as microbial growth, it is most advantageous to separate entrained air.

[0003] Conventionally, gas separation from flows of minor volumetric rate has been carried out by passing the end of a pipe under the surface of water. The purpose of keeping the pipe end submerged under water is to form a water trap to the outlet of the pipe. However, a problem arises at high flow rates therefrom that water can transport the air as bubbles along with its flow, whereby gravity buoyancy of the bubbles does not impart them a sufficient large upward velocity to move them against the flow fast enough to overcome the downward velocity of the water flow.

### SUMMARY AND OBJECTS OF THE INVENTION

[0004] The present invention is directed to provide an arrangement capable of eliminating the above-described problems. It is a particular object of the invention is provide both an apparatus and a method for separating gas from a liquid. The characterizing features of the invention are disclosed in the appended claims specifying a novel arrangement for separating gases from a liquid handled in a process industry.

[0005] More specifically, the assembly for separation of gas-containing liquids, particularly for separating air therefrom, is characterized by having a liquid-flow, guide adapted to the lower end of the inlet pipe discharging gas-containing liquid into a container.

[0006] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

### BRIEF DESCRIPTION OF THE DRAWINGS

~~In the following, the invention is described in more detail with the help of an exemplary embodiment by making reference to the appended drawings in which~~

[0007] The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:



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**[0008]** FIG. 1 a flow guide according to the invention for separating gas from the flow of gas-containing liquids handled in a process industry;

**[0009]** FIG. 2 shows an embodiment of a liquid flow measurement arrangement I according to the invention; and

**[0010]** FIG. 3 shows an embodiment of a liquid flow receiver container according to the invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0011]** Now referring to FIG. 1, a guide 2 of a liquid flow 7 is mounted essentially to the lower end of an inlet pipe 1 discharging gas-containing liquid into a container. The height position of the flow guide 2 in the vertical direction is adjustable with the help of fixture means 13 for optimizing the separation efficiency. Depending on the type of the liquid being handled in the process, the shape of flow guide 2 can be made essentially flat, upward concave or downward convex. Advantageously, the bottom of the flow guide 2 is made concave so that its edges are curved upward toward the liquid level surface. More precisely, the flow guide 2 is made from sheet metal, perforated plate or a sheet material having a desired contour such as undulated plate. As shown in FIG. 1, the flow guide 2 is advantageously mounted on support rods 10 or the like elements that displace the flow guide substantially at a distance from the lower end of the inlet pipe 1. The shape and material of the flow guide can be varied as required. The optimum dimensions of the flow guide are determined by several design factors such as the kind of fluid flowing in the process, the viscosity, temperature, gas/air concentration 9 thereof

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and the velocity of the liquid flow 7. The final design can be best optimized with the help of laboratory tests.

**[0012]** In FIG. 2 is shown a preferred exemplary embodiment adapted for flow measurements, whereby the function of the flow guide 2 is to deflect the liquid flow 7 so as to direct the flow toward the liquid level surface. The flow guide 2 makes it easier to direct the liquid flow 7 formed by water with entrained air upward toward the liquid level surface thus facilitating the separation of air 9 from water 7 in order to further provide a solid flow 8 (liquid with the entrained air 9 separated out). Herein it must be understood that in a conventional arrangement the liquid flow 7 takes place in a consistently downward direction which makes the separation of air bubbles 9 very difficult. Further aiding the function of flow guide 2 in the embodiment according to the invention, the design of a container 11 serving as a liquid receiving vessel is advantageously made such that the flow velocity becomes sufficiently slow to augment the separation of air bubbles 9. Additional stabilization of the solid flow 8 is gained from the use of a partition 3 and a narrow channel 6 at the bottom of the container 11 into flow-receiving chamber 12 of the container 11. After entering the chamber 12, the solid flow 8 passes through a weir 4 formed in an outer wall 5 of the container 11.

**[0013]** In FIG. 3 is shown an exemplary embodiment wherein the flow guide 2 is adapted to a gas-separating container. In this example, the flow guide 2 is mounted essentially in the fashion as in FIG. 1 to the lower end of an inlet pipe 1 discharging gas-containing liquid into a container. On the above described grounds, this embodiment according to the invention can be used in a great number of applications dealing with a liquid flow 7 carrying entrained gas, most typically air 9, that is desired to be efficiently

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separated or at least reduced down to a suitable level. In a process industry, such problems are encountered probably most frequently in the pumping of liquids and measurements performed thereon. The inventive spirit of the present arrangement is based on guiding air 9 and other entrapped gas bubbles toward the surface level of a liquid container thus augmenting and speeding up the removal of entrained gas. The arrangement according to the invention can be used in almost any type of inlet pipe 1 of measurement vessels and containers wherein the removal of air 9 and other gases is desired to be augmented.

**[0014]** To a person skilled in the art it is obvious that the invention is not limited by the above-described exemplary embodiments, but rather may be varied within the inventive spirit and scope of the appended claims.

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[57] Abstract

ABSTRACT OF THE DISCLOSURE (Revised)

The invention relates to an assembly and a method for ~~separation of~~ separating gas ~~from~~ gas-containing liquids handled in a process industry. ~~The invention is characterized in that, for the separation of~~ For separating the entrained gas, particularly air (9), or partial removal thereof, from a liquid flow (7), the apparatus includes a liquid-flow guide (2) adapted substantially close to the lower end of an inlet pipe (1) discharging the gas-containing liquid into a container.

(FIG. 1)